DECOUPLING STANDARDS FROM PRACTICE: THE IMPACT OF IN-HOUSE CERTIFICATIONS ON COFFEE FARMS' ENVIRONMENTAL AND SOCIAL CONDUCT

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Abstract

In this paper we investigate whether coffee farms, who have obtained an in-house socio-environmental certification by a global buyer, display a better social and environmental conduct as compared to non-certified farms. We perform an econometric analysis using data from an original cross-country survey covering 575 farms in different regions of Brazil, Colombia, Costa Rica, Guatemala and, Mexico. We find that farms who have been granted the in-house certification display a better environmental conduct than non-certified farms, but not a better social conduct. We also find that the positive relationship between in-house certification and environmental conduct is stronger when farms sell to cooperatives, and when they are located in institutionally weak countries. Finally, we find that the institutional strength of farms' home countries positively influences their social conduct. We discuss how our analysis contributes to the literature on the social and environmental impacts of certifications and to scholarship interested in global value chains' social and environmental upgrading.

Key-words: In-house certification, social and environmental conduct, decoupling, coffee value chain, global buyers, Latin America.

1. INTRODUCTION

The production of certified goods has grown dramatically since the 2000s, driven by consumers' concerns with the sustainability of agro-food and other industries' value chains and by global buyers' commitments to source more of their inputs from certified suppliers (Bartley, 2007; Muradian & Pelupessy, 2005; Potts, Lynch, Wilkings, Huppé, Cunningham, & Voora, 2014). Certifications come normally with the adoption of voluntary standards and codes of behaviors (Levy, Reinecke, & Manning, 2015), and provide certified suppliers with both a set of principles that they are expected to live up to and a process for implementing and monitoring those standards (Gilbert, Rasche, & Waddock, 2011). They have become widespread in industries characterized by the concentration of production in developing countries, such as forestry, coffee, horticulture, and tropical fruit (Muradian & Pelupessy, 2005; Bartley, 2007; Kleeman, Abdulai & Buss, 2014).

The whole idea behind such certifications is that they can potentially allow farmers and other producers to improve their social and environmental performance and receive higher prices and easier access to markets – thus boosting their economic performance accordingly. This is particularly important when suppliers are small farmers based in developing countries, who, being far from the final consumer, tend to capture only a small share of the value generated in their industry (Valkila, 2009). This rationale is grounded on the premise that the final consumer, who is oftentimes based in advanced economies, is willing to pay premium prices for certified products, because certifications provide information about the origin of the product and signal adherence to good practices by suppliers and their buyers (Giovannucci & Ponte, 2005; Valkila, Haparanta, & Niemi, 2010).

Coffee, one of the most traded commodities in the world, and the context of this study, has been at the forefront of the debate on standards and certifications. The vast majority of coffee is produced by small farms in the developing world, acquired by large global buyers, and then consumed mostly in the US, Europe, and Japan (Giovannucci & Ponte, 2005). According to the International Trade Center (ITC), certified coffee is no longer a small market niche: in 2009 more than 8% of all the green coffee exported worldwide had some form of certification or credible claim of sustainability, and some countries imported high shares of certified coffee over non-certified one (e.g. 40% in the Netherlands; 16% in the US; 10% in Denmark, Sweden and Norway) (ITC, 2011). By 2012, certified coffee reached 40% of global production (Potts et al., 2014).

Given their growing relevance in the coffee market, a significant body of research has investigated the impact of certifications on different socio-economic conditions of farmers and small scale farms (Arnould, Plastina & Ball, 2009; Barham, Callenes, Gitter, Lewis & Weber, 2011; Barham & Weber, 2012; Bolwig, Gibbon, & Jones, 2009; Chiputwa, Spielman & Qaim, 2015; Jena, Stellmacher, & Grote, 2015; Jurjonas Crossman, Solomon & Baez, 2016; Ibanez & Blackman, 2016; Kleeman et al., 2014; Luna & Wilson, 2015; Levy, Reinecke & Manning, 2015; Loconto, & Dankers, 2014; Muradian & Pelupessy 2005; Neilson, 2008; Ortiz-Miranda & Moragues-Faus, 2015; Raynolds, 2009; Raynolds, Murray & Heller, 2007; Renard, 2010; Ruben & Zuniga, 2011; Ruben & Fort, 2012; Taylor, 2005; Utting-Chamorro, 2005; Van Rijsbergen, Elbers, Ruben & Njuguna, 2016; Valkila et al., 2010; Vellema, Casanova, Gonzalez & D'Haese, 2015; Wollni & Zeller, 2007). Several methodological advancements have been proposed to this aim (Blackman & Rivera, 2011), but existing studies are still far from being conclusive about the positive impacts of certifications on farmers, small firms, and other constituencies. As a matter of fact, a recent comprehensive literature review undertaken by the Food and Agriculture Organization (FAO) concludes that: "*the evidence of the impacts of voluntary standards is still weak*" (Loconto & Dankers, 2014: ix).

While most earlier studies on certifications' impacts have focused on the experience of the multilateral and NGO-led certifications like those promoted e.g. by Fairtrade, Organic or UTZ (e.g. Taylor, 2005; Neilson, 2008; Raynolds, 2009; see also Loconto & Dankers, 2014 for a review), the focus of this research is on the more recent phenomenon of in-house certifications, which are set by private firms, typically large global buyers or multinational corporations (MNCs) orchestrating relevant value chains around different locations (Reinecke, Manning, & Von Hagen, 2012). In the coffee industry, examples include Starbucks, which developed its C.A.F.E. (Coffee and Farmers Equity Practices Programs) certification program, where farmers are ranked depending on the extent to which they comply with a set of criteria related to four areas of their production process (i.e. product quality, economic accountability, social responsibility and environmental leadership) (Renard, 2010). Likewise, preoccupied with declining incomes in the areas producing high quality beans, Nespresso (Nestlé Group) developed a sustainability program in 2003 (i.e. the Nespresso AAA Sustainable Quality program) (Nespresso, 2012), while other major global buyers in the coffee industry followed suit to develop their own in-house certification and/or sustainability programs (e.g. Illy and Sara Lee).

Global buyers involved in the production and commercialization of coffee have made strong commitments to increase the share of coffee they source from certified farmers, with Starbucks having recently claimed that 99% of its coffee purchases are from certified farms, most of which have its own in-house certification (Starbucks, 2016), while 84% of the coffee purchased by Nespresso was estimated in 2013 to come from AAA farms (Panhuysen & Pierrot, 2014).

These initiatives have become part and parcel of coffee global buyers' social responsibility programs. For instance, Nespresso AAA sustainability program was largely celebrated by Porter & Kramer (2011), for being a successful example of the Creating Shared Values (CSV)[1] approach,

[1] According to its proponents, CSV puts sustainability at the very core of the business activity, by (i) re-conceiving products and markets so that they can meet true societal and environmental needs, and target underserved markets; (ii) re-defining productivity in the value chain, by promoting sustainability among the different actors of the chain; and (iii) building supportive industry clusters at the company's sites.

which allegedly helps small farmers in impoverished rural areas of Africa and Latin America to increase their income, reduce environmental impacts and, consequently, create shared value in the community.

Besides being on the rise, in-house certifications/programs may possess characteristics that differ from other kinds of NGO-led certifications, which justify their analysis. As suggested by Giovannucci, Liu & Byers (2008), in-house certifications/programs have often been seen with some degree of skepticism and have seldom been included in sustainability discussions, because they may be used instrumentally by private firms to satisfy their own ends rather than to truly improve the livelihood conditions of farmers: "*they may not meet the economic needs of producers ...by not providing adequate remuneration for sustainable production practices*" (p. 44). So far, however, very few authors have investigated their impacts (notable exceptions include Ruben & Fort, 2012; Ruben & Zuniga, 2011; Barham & Weber, 2012), with some anecdotal evidence emphasizing their meaningfulness for farmers (Porter & Kramer, 2011).

In this paper we investigate the relationship existing between the adoption of an in-house certification by coffee farms and their social and environmental conduct. By social conduct, we refer to practices that guarantee the safety and health of workers (e.g. use of protection while spraying pesticides or other chemicals) at the farm-level and to practices that demonstrate or enhance the socio-economic rights of workers, farmers and their family members (e.g. salaries not lower than minimum wage; existence of written contracts, right to education of children, child labor policies, among others). By environmental conduct we mean here the set of practices that farms enact to have a better environmental management of their operations, spanning adoption of recycling to a more conscious and reduced use of pesticides.

What prompts us to consider farms' social and environmental conduct rather than more specific economic outcomes (productivity, income, etc.), is the notion of development as "*the*

removal of various types of unfreedoms" (Sen, 1999: xii), and the contention that certifications can be an opportunity to improve farmers' (and their families') rights – including right to health, to live a decent life; workers' rights; children or female rights, among others, which appear to us as relevant as income-related improvements. To be sure, the improvement of these rights is a core part of the sustainability programs and certifications, as these schemes demand certain socio-environmental standards to be met for suppliers to receive certification. In spite of this, compliance with those standards should not be taken for granted after certification has been awarded.

Neo-institutional management scholars have described the (partial or total) lack of compliance to standards by recurring to the notion of *organizational decoupling*, which refers to the creation and maintenance of gaps between formal policies and actual organizational practices (Bromley & Powell, 2012; Marquis & Qian, 2013). The relevance of this notion for understanding the impact of certifications is that decoupling "*enables organizations to maintain standardized, legitimating, formal structures while their activities vary in response to practical considerations*." (Meyer & Rowan, 1977, p. 357) We bring this notion to the context of coffee farming, where certifications allow farms to be seen as legitimate economic actors vis a vis their commercial partners (e.g. global buyers or other intermediaries) because they formally commit to the adoption of socio-environmental standards. [2] However, as suggested by some of the earlier research, farmers may experience difficulties in fully complying with the standards requested by their certification

[2] We maintain here that decoupling can be observed also in smaller farms and very simple organizations employing just a few employees – even when these employees are family members. We thank an anonymous reviewer for challenging us with the applicability of the notion of decoupling in the context of small farmers that often employ family work: why would they not be willing to improve the social conditions of their family members or their right to work in a more environmentally safe place? While intuitively correct, we recur here to the economics literature on the value of life and health, which suggests that people attribute growing value to life and health as their income increases (see among others works by Deaton, 2003; Murphy & Topel, 2006; Hall & Jones, 2007). In very simple terms, this literature suggests that poor people are keener than rich people to sacrifice some of their health rights for some immediate economic returns. On these grounds, we believe that it is plausible that farmers will be keen to privilege immediate economic returns over the enhancement of the socio-environmental conditions of their family members and/or workers. This does not mean that they intentionally do harm to their family members to save money and maximize their economic returns, but it may provide some incentives for delaying or not implementing certain practices that could potentially generate positive social and environmental impacts. These insights suggest that the notion of decoupling can be usefully applied to the context of small scale farms.

(Loconto & Dankers, 2014). For instance, they may not be able or willing to guarantee enough safety conditions, or to recycle as requested by the certification. Numerous studies conducted on developing countries' small scale informal producers operating at the latest echelons of global value chains have documented the presence of decoupling practices associated to standards and certifications, especially those that are imposed top-down from large MNCs (for a review, see Giuliani, 2016). Recently, a State of Sustainability Initiative (SSI) review found that, on average, the two most important sectors in terms of standard-compliant production market share (coffee and cocoa) had only 35 per cent and 33 per cent of total production actually sold as compliant, respectively (Potts et al., 2014).

There may be different motivations for decoupling standards from practice: some diverging practices may be in good faith and be guided by local specificities that do not allow for the full implementation of the standards' provisions (e.g. cultural resistance to some practices) (De Neve, 2009). In other cases, firms may exploit information asymmetries and imperfect monitoring to reduce production costs – for instance by avoiding the implementation of costly environmental practices, or of enhanced protection of female workers during pregnancy (Blowfield & Dolan, 2008).

Drawing on these considerations, we investigate, first, whether certified farms display a better social and environmental conduct than non-certified ones. The underlying contention is that the practice of decoupling will nullify the social and environmental impacts of the in-house certification and the difference between certified and non-certified farms. Second, we dig further into the moderators of these relationships. We focus on three factors that we consider to either exert some pressure on certified farmers' willingness to comply with the standards provisions, or to enable certified farmers' compliance. First, we consider the type of local buyers/MNCs that intermediate the relationship between farmers and coffee global buyers, and we distinguish between cooperatives and other private intermediaries (including traders, local roasters, exporters, etc.) Next, we consider the role of the farmers' home country institutional strength as an enabler of farmers'

compliance, and finally we focus on farmers' economic status on the grounds that wealthier farmers will be more at ease with investing resources and time on complying with standards.

To explore the proposed issues we conduct several econometric analyses (generalized linear regression, simultaneous equations system, outlier trimming robust regression, Propensity Score Matching (PSM) and quantile regression) using an original cross-country survey covering 575 certified and non-certified farmers in different regions of Brazil, Colombia, Costa Rica, Guatemala and, Mexico. Our results show that stronger home country institutions – in terms of the quality of the civil and public services, the ability of the government to formulate and implement sound policies and regulations, and to ensure the rule of law – appear a fundamental ingredient for the promotion of a more socially sustainable production, irrespective of whether farmers are certified or not. Instead, certified farmers show a better environmental conduct vis a vis non-certified ones, and this positive relation is stronger when they sell most of their produce to cooperatives, and when they belong to institutionally weaker countries. Farmers' economic status does not appear to moderate the proposed relationships in any way.

The paper is structured as follows: First, we review the literature on the effects of certifications in the context of agro producers located in developing countries (Section 2), and develop the theoretical framework in Section 3. In Section 4, we describe the data and methods of this study, while we present our results in Section 5 and conclude by discussing their implications in Section 6.

2. SOCIO-ENVIRONMENTAL IMPACTS OF CERTIFICATIONS: REVIEW OF THE EVIDENCE

A wealth of academic research has been produced on the effects of certifications on yields, crop quality, farm gate prices, household living standards, and other economic measures (among many others, see e.g. Barham & Weber, 2012; Bolwig et al., 2009; Chiputwa et al., 2015; Kleeman et al., 2014; Ruben & Zuniga, 2011; Vellema et al., 2015; see also Loconto & Dankers, 2014). While

acknowledging the relevance of studies on the economic impacts of certifications, we focus here on research that has more directly attempted to observe certifications' social and environmental impacts, in line with our proposed research questions.

Impact studies on the latter, typically focus on a set of ecological indicators, and pro-environmental production practices. For instance, in a qualitative study of Nicaraguan Fairtrade cooperatives, Utting-Chamorro (2005) finds that the Fairtrade certification increases farmers' awareness about environmental issues and practices, and leads to an increase in their investments in capacity building and diversification. In one of the earliest quantitative studies on this subject, Philpott, Bichier, Rice, & Greenberg (2007) analyze the differences between certified (Organic and Fairtrade) and non-certified areas of Mexican coffee producers in terms of their outcomes on ecological indicators such as biodiversity, but their analysis did not yield significant results.

More recent studies yielded more positive effects of certifications on environmental practices. For example, Bolwig et al. (2009) examine 160 Ugandan farmers, showing that Organic certification produces positive effects on farmers' environmental conduct, in particular on soil management techniques. Similarly, Blackman & Naranjo (2012) examine the impact of the Organic certification on a sample of 2603 farmers in Costa Rica using PSM to control for selection bias. They find that certified farmers reduce the use of fertilizers, pesticides and herbicides, and increase the use of organic fertilizers. They also argue that third-party monitoring and a clear definition of criteria of the certification facilitates compliance. The study moreover suggests that enforced monitoring seems to be more effective in eliminating negative practices (e.g. eliminating the use of chemicals) than promoting positive actions, such as introducing soil conservation practices, hinting at the heterogeneous effects of monitoring on conduct. Positive results of Organic certification on farmers' environmental management are also found by Ibanez and Blackman (2016), who examine coffee farmers in Colombia and find that being certified leads to improvements in waste disposal, as well as increased use of organic inputs. In a different study on Colombian coffee producers, Rueda, Thomas, and Lambin (2013) use satellite images to study environmental practices in the areas

where coffee producers adopted the Rainforest Alliance certification, finding a positive effect of the certification on tree cover and diversity. Likewise, Takahashi and Todo (2013) found that the likelihood of deforestation in Ethiopia was lower in Rainforest Alliance certified areas.

Some studies did also focus on the social repercussions of certifications, using a different set of social measures, including access to education, health and food security, among others. For instance, Becchetti and Costantino (2008) examine the impact of the Fairtrade certification on 120 Kenyan herb farmers, observing some positive effects of the certification on access to food (measured as expenditure on food and dietary variety) and health (captured via infant mortality and use of hospitals for births). However, their findings with regards to the use of child labour and investments in human capital are inconclusive. Arnould et al. (Arnould, Plastina, & Ball, 2009) study the effects of membership in Fairtrade certified cooperatives focusing on a multi-country sample of 1269 farmers from Guatemala, Nicaragua, and Peru and a control group of 388 non-certified farmers. They study the impact of certifications on household-level health, measured both in terms of access and illness indicators, and education, measured as numbers of years of formal education and probability of being in education. Using different econometrics models they find that certifications have positive effects on the likelihood of being in education, though not on the level of education. Their study also illustrates that there are no clear effects of certifications on health related behavior and indicators. Only farmers that had been members of the Fairtrade cooperatives for at least six years did have better health indicators, suggesting that effects of certifications on health issues may take time to materialize. Somewhat differently, Mendez et al. (Mendez, Bacon, Olson, Petchers, Herrador, Carranza, & Mendoza, 2010) examine the effects of the Organic and Fairtrade certifications on 469 coffee farmers in El Salvador, Guatemala, Mexico and Nicaragua, and fail to find an association between certification and improvements in education, measured as the number of school age children that are effectively attending school. The authors also examine whether the certifications are related to other livelihood dimensions, such as savings, credit, food security and migration, finding a positive relationship only with farmers' savings and access to

credit. With reference to food security, instead, certified farmers reported to face more challenges that non-certified farmers, possibly due to the former becoming more specialized in coffee, at the detriment of other crops.

Ruben and Zuniga (2011) study 315 farmers in Nicaragua using PSM and comparing the effects of Starbucks C.A.F.E, Rainforest and Fairtrade certifications, showing that none of them appears to have a tangible impact on farm workers' wages or gender relationships. Van Rijsbergen et al. (Van Rijsbergen, Elbers, Ruben, & Njuguna, 2016) examine the impact of Fairtrade and UTZ certification on 218 Kenyan coffee farmers, using a matched panel and observations in 2009 and 2013. Besides focusing on different types of economic impacts occurring at the farm, household, cooperative and community levels, their study examines also some social impacts including access to potable water and increased access to latrine to reinforce sanitary conditions. Results on social impacts suggest that UTZ farms have better access to sanitation, but neither UTZ nor other certifications have effects on access to potable water. Finally, Ruben and Fort (2012) study the impact of the Fairtrade certification on a sample of 320 Peruvian organic and non-organic farmers, using PSM. They find that Fairtrade certified farmers had accumulated more assets and had more positive attitudes about the future, though their environmental behavior did not differ much, save for a more intensive use of organic fertilizer by Fairtrade organic farmers than non Fairtrade organic farmers, which they attribute to the technical cooperation provided by Fairtrade cooperatives to its members. This study is also interesting because farmers claim that the most tangible benefits of Fairtrade are about technical assistance and credit, while "*many farmers prefer using the Fairtrade premium for individual purposes and tend to undervalue investments made for collective and community services (education, health care, water, and electricity).*" (p. 578)

In sum, there seems to be a growing body of empirical studies showing that certifications have positive effects on farmers' environmental conducts (e.g. Blackman & Naranjo, 2012; Rueda et al., 2013; Ibanez & Blackman, 2016), which opens up interesting questions about what are the factors that make this positive impact more or less likely to manifest. At the same time, however,

evidence that certifications have positive effects on the social conduct and the social conditions of farmers, their families, and on workers and other constituencies influenced by farms' operations more broadly (including minimum wages, access to water, sanitation, health, education, etc.) remain scant and largely inconclusive. We thus aim to contribute to the literature providing new empirical evidence on the impact of in-house certifications on farmers' environmental and social conduct.

3. CONCEPTUAL FRAMEWORK

3.1 Farmers' in-house certification and their socio-environmental conduct: Decoupling standards from practice

Farmers who have obtained an in-house socio-environmental certification may choose to conduct their business in two ways. On the one hand, they may substantively put in practice all the social and environmental principles that are inherent in the certification. This means that they will adopt practices that will contribute to improve the environmental management of the farm, as well as promote good social practices in favor of their employees and other relevant constituencies (e.g. communities working nearby the farm). In this case, therefore, the farmers will be compliant with the standards associated to their certifications, and in so doing their social and environmental conduct would result better than that of similar non-certified farmers. On the other hand, farmers may decouple standard from practice and opt for a symbolic adoption of certifications that allows them to enter the coffee value chain and become legitimized as high quality and sustainable suppliers, without bearing all the costs of compliance. In this case, therefore, farmers' post-certification conduct would not comply with the standards, either fully or partially (Jamali, Lund-Thomsen, & Khara, 2015; Giuliani, 2016). According to neo-institutional theorists who have first introduced the notion in the context of management research, the practice of decoupling occurs when

> "*to maintain ceremonial conformity, organizations that reflect institutional rules tend to buffer their formal structures from the uncertainties of technical activities by becoming*

loosely coupled, building gaps between their formal structures and actual work activities" (Meyer & Rowan, 1977, p. 341).

Decoupling often occurs in 'opaque' institutional fields, that is in contexts where "*observers have difficulty identifying the characteristics of prevailing practices, establishing causal relationships between policies and outcomes, and measuring the exact results of policy implementation.*" (Wijen, 2014, p. 302) The field of socio-environmental governance is considered to be one of those opaque contexts where the alignment between the formal adoption of standards and the actual conduct may be hard to fully understand, causally attribute and measure. Developing countries pose an additional challenge to this as they may be a context where it is difficult to monitor and fully establish relationships between standards and conducts due to their institutional weakness and other failures, although with differences from country to country. Earlier research conducted in developing countries, but in sectors other than the coffee industry, shows that decoupling is a rather widespread practice (e.g. De Neve, 2009; Mezzadri, 2012; Jamali et al., 2015), and it is more likely to occur in the absence of rigorous monitoring and support to suppliers (Giuliani, 2016).

Enacting decoupling strategies may be cost-efficient for producers, as lack of compliance or deviations from standards may translate into lower investments in new or demanding socio-environmental practices. This problem is compelling in coffee production, where farmers are often not able to market all of their certified crop and end up selling it as non-certified and at a lower price – in spite of the additional costs met to obtain certification (ITC, 2011). This makes it sometimes hard for smaller farmers to gain from their certification (Beuchelt & Zeller, 2011; Ibanez & Blackman, 2016; Neilson, 2008; Ortiz-Miranda & Moragues-Faus, 2015; Valkila et al., 2010; Vidyarthi, 2015), which may constitute a motivation to cut their operating costs by way of decoupling.

Monitoring and enforcement of voluntary codes of conduct is also less than perfect in the coffee industry, precisely because suppliers are numerous and geographically dispersed in remote

areas, and this can create some leeway for non-compliant behavior (Blackman & Naranjo, 2012). Furthermore, although global buyers granting in-house socio-environmental certifications give equal prominence to both social and environmental issues, and set a multiplicity of rules and criteria that should guide the conduct of farmers, these rules may be vaguely defined and farmers may find hard to comply with all of them. This in turn may lead to some deviance, with farmers deciding to selectively pick the areas where they intend or are capable of enacting substantive practices. For instance, they may privilege practices that are more easily manageable and give farmers more immediate and foreseeable economic returns like waste management, over practices that are likely to yield results over the longer period – such as for instance investments in the quality of life of workers and their family.

Based on these considerations, farmers may be more or less inclined to decouple their practice from standard. In the presence of significant decoupling taking place at the farm level, we would not expect substantial differences to emerge in the social and environmental conduct of certified farmers vis a vis non-certified ones. In contrast, in the absence of decoupling (or even if decoupling is minimal), we would expect certified farmers to display a better social and/or environmental conduct than similar non-certified ones. However, the core issue here is not only whether certified farmers display a better social and/or environmental conduct than non-certified farmers, but what are the factors that makes this more or less likely to occur. We therefore dig into the moderators of these proposed relationships, as discussed below.

3.2 Moderating factors

We focus on moderators that should influence farmers' willingness to comply with the standards provisions, or enable their compliance. First, we consider the type of local buyers that intermediate the relationship between farmers and coffee global buyers, where we distinguish between cooperatives and other private intermediaries (including traders, local roasters, exporters, etc.) Next, we consider the role of the farmers' home country institutional strength as an enabler of farmers'

compliance, and finally we focus on farmers' economic status on the grounds that wealthier farmers will be more at ease with investing resources and time on complying with standards.

3.2.1 Type of intermediaries: cooperatives vs. private intermediaries

We examine whether the effect of certifications on farmers' social and environmental conduct is moderated by the type of intermediaries to which farmers sell the majority of their coffee.[3] Focus on intermediaries is justified by the way the coffee value chain is organized: production at the farm level is fragmented, while the commercialization of coffee is highly concentrated. Hence, in order to simplify their purchasing processes, global buyers (such as e.g. Nespresso or Starbucks) tend not to buy coffee directly from the farmers, but from an array of different organizational actors that act as intermediaries in the coffee value chain. The core of our argument is that the organizational differences among different intermediaries may engender different types of pressures on suppliers, or to provide them with different types of support which ultimately shape their decisions or capacity to comply with the standards' provisions, enhancing the social and environment conduct of certified farmers accordingly (Neilson, 2008; Raynolds, 2009).

To this aim we distinguish cooperatives from private intermediaries. The latter group includes coffee roasting companies and traders/exporters and other residual types of private intermediaries. Coffee roasting companies are among the oldest types of intermediary in the coffee industry and are private businesses that acquire coffee from farmers, select it, process it, and sell it both domestically and in the global market through a variety of channels, such large importers from Europe or the US, which then commercialize it to large roasters, to niche importers that sell the coffee in specialty shops (e.g. organic or ethnic focused retailers), or to agents of large global roasters. Thus, local coffee roasting companies are a key node in the global value chain for coffee

[3] We acknowledge that farmers may sell to different kind of local buyers at the same time. However, the focus here on the farmers' main local buyer – i.e. the type of local buyer they sell *most* of their coffee. We expect the most important buyer (vis a vis more marginal local buyers) to bear higher influence on farmers conduct.

(Loconto & Dankers, 2014). A similar intermediary role is played by traders, which can be large conglomerates based in developed economies, such as Neumann Kaffee Gruppe, based in Germany, and Ecom, based in Switzerland, that operate locally to buy large quantities of coffee from different types of actors and then commercialize it to large global buyers, such as Nespresso, Sara Lee, Lavazza, and Starbucks.

We distinguish these private intermediaries from cooperatives, which earlier research has described as being organizationally different from pure private firms, because they are organizations that are voluntarily founded and governed by their members to serve their own social and economic interests (Peterson and Anderson, 1996). This form of organization is particularly diffused in the agriculture and very common also in coffee producing areas (Wollni & Fischer, 2014; Jena et al., 2015). While reviewing the vast literature on cooperatives' functioning is well beyond the scope of this paper (interested readers can refer to Cechin, Bijman, Pascucci, & Omta, 2013; Drivas & Giannakas, 2010; Fischer & Qaim, 2012; Kurjańska, 2015; Luna & Wilson, 2015; Mujawamariya, D'Haese, & Speelman, 2013; Murekezi, Jin, & Loveridge, 2012; Murray-Prior, Sengere, & Batt, 2009; Ortiz-Miranda & Moragues-Faus, 2015; Pennerstorfer & Weiss, 2012; Handschuch, Wollni, & Villalobos, 2013; Shepherd, 2007; Wang & Qin, 2012; Wollni, Lee, & Thies, 2010; Wollni & Zeller, 2007), one underlying contention of why cooperatives differ from private market intermediaries is that this organizational model is able prompt a set of pro-social behaviors among its members. Earlier research on cooperatives has shown that its members engage in superior forms of coordination that reduce transaction costs, asymmetric information and allow them to achieve economies of scale in the acquisition or use of certain production inputs, as well as to increase their bargaining power vis a vis their buyers (Fischer & Qaim, 2012). Several studies have shown that cooperatives often help farmers coordinate collective action, for example, by lobbying governments for subsidies on agricultural inputs (Calvo Coin & Wachong Ho, 1998; Wollni & Zeller, 2007). Cooperatives do also often engage in the provision of selective club goods, such as shared services, training and technical support and knowledge sharing that allows its

members to upgrade production standards and products (Arnould et al., 2009; Kurianska, 2015; Ortiz-Miranda & Moragues-Faus, 2015; Perez-Aleman, 2011; Vidyarthi, 2015; Wang & Qin, 2012). When it comes to socio-environmental standards, cooperatives are also sometimes involved in helping global buyers identifying farmers suitable for certification, as well as in the eventual evaluation of certified farms (Raynolds, 2009).

These considerations motivate us to further examine the role that these different intermediaries play in moderating the relationship between farmers' certification and their social and/or environmental conduct. Based on conventional wisdom about cooperatives and their functioning rules, we posit that the relationship between certification and social and environmental conduct will be positively moderated when farmers sell predominantly to cooperatives. Certified farmers having cooperatives as main buyers may receive more technical support from the cooperative (e.g. by receiving professional advice, or other types of managerial support) (Brown, Del Rosario, & Agagnon, 2015; Luna & Wilson, 2015), and may therefore be better positioned to comply with the standards' provisions. Also, social monitoring among farmers may be particularly high, because, as compared to other intermediaries, cooperatives are very much rooted into a specific context and their members are likely to operate rather close-by within a geographically bounded area. This may therefore generate less opportunities for decoupling.

An additional motivation for our proposed positive moderating effect of cooperatives, is that certified farmers that sell most of their produce to cooperatives may play a particularly important signaling role vis a vis global buyers, a role that can be instrumental to cooperatives' own legitimacy appeals - which in turn may serve to increase their bargaining power, and support quests for higher prices or better infrastructures vis a vis different types of constituencies. In other words, because socio-environmental certifications are signals of some hidden qualities that would not be observable otherwise (King & Toffel, 2009), connections to certified farmers may benefit cooperatives by generating positive signals and raising their legitimacy accordingly. Decoupling would be a menace to all this, because if failure to comply is ultimately discovered by the certifying

entities, in this case the global buyer, non compliers may be excluded from certification with negative signals following this event and jeopardizing cooperatives' own objectives. On these grounds, cooperatives may have a reinforced incentive to prevent their farmers from deviating their practice from the standards.

3.2.2 Farmers' home country institutional quality

We have mentioned earlier that decoupling is more likely to occur in opaque institutional fields or contexts, where, among other things, rules and regulations are not perfectly understandable, nor there is a rigorous, predictable and clear cut process of monitoring. We contend here that the institutional quality of farmers' home countries, defined in terms of the quality of the civil and public services, the ability of the government to formulate and implement sound policies and regulations, and to ensure the rule of law (Kaufmann, Kraay, & Mastruzzi, 2011), is an important moderator in the main relationship under interest.

We know from earlier sociological research that institutional pressures present in a given context or country influence the conduct and choices of economic actors (DiMaggio & Powell, 1983). These approaches suggest that economic actors adapt to formal and informal rules existing in their own environment (regulations, laws, codes of conduct, etc.) in order to be accepted among their peers and facilitate their business operations in their field. Institutionally strong countries are more likely to exert pressures on economic actors and other constituencies, and to model their choices in ways that align with the country's rules and regulations. Therefore, in such contexts, abidance by the law is more expected than in countries characterized by weaker rule of law. On these grounds we conjecture that certified farmers will be more likely to comply with the socio-environmental standards' provisions the higher the institutional quality of their home countries – displaying a better social and/or environmental conduct than non-certified farmers.

3.2.3. Farmers' economic status

So far we examined two different types of external pressures for compliance, but the decision to comply with standards provisions is ultimately an individual decision of farmers. We posit here that farmers' income positively moderates the relationship between adoption of certifications and conduct. Our argument is based on the idea that there are substantial costs involved in the compliance with standards. According to Handschuch, Wollni and Villalobos (2013), compliance involves both recurrent and non-recurrent costs. The latter refer to one-time initial investments necessary to meet the requirements of the standards, such as construction of a medical aid point, or improvement of water provision infrastructures. The former refer to more regular and periodic costs being borne by compliant farmers such as extra costs related to higher salaries, annual soil or water analyses, etc. These costs suggest that small scale farms might not able to extract much tangible benefits from certifications, and thus be less likely to either adopt standards or comply with them after adoption (see e.g. Loconto and Dankers, 2014; Handschuch et al., 2013; Ibanez & Blackman, 2016; Beuchelt & Zeller, 2011).

Against this background, farmers' income is an important dimension to look at, because poorer farmers may be more inclined to cut costs and seek efficiency gains by decoupling their practice from standards (Baucus & Near, 1991). For instance, poorer farmers may decide to implement standards that appear to be more likely to deliver an economic return – like better waste management, or reduction in the use of electricity that can lead to lower expenses, while avoid complying with more resource-demanding standards like providing suitable protection for spraying pesticides, or that are less difficult to monitor (e.g. guaranteeing democratic decision making in the farm). In contrast, wealthier farmers, may have enough resources to invest in the implementation of different types of standards. We therefore posit that certified farmers will display a better social and environmental conduct the higher the income they can count on.

4. DATA

4.1 Sample and Data Collection

Our analysis is set in the context of coffee farmers located in different regions of Brazil, Colombia, Costa Rica, Guatemala and Mexico. We rely on an original survey conducted by one of the co-authors of this paper together with a non-profit third-party organization to assess the impact of the in-house certification of a global buyer in the coffee industry.[4] The program was developed by the global buyer to enhance the productivity of farmers, as well as to promote higher quality coffee produced through socially and environmental sustainable practices. In this respect, the in-house certification program includes numerous criteria that certified farmers need to meet on social issues, such as workers' health and safety, working conditions, child labor, democratic decision making with the farm, as well as community relations issues, and environmental issues, such as soil conservation, waste management, use of pesticides, among others. As in other certification schemes, certified farmers receive a premium price for the higher quality and sustainable coffee.

The study focuses on the regions where the global buyer purchases its coffee: the municipalities of Monte Carmelo, Coromandel, Serra do Salistre, and Rio Paranaiba in the Minas Gerais state of Brazil; the departments of Caldas and Narinos in Colombia; the cantons Naranjo and Paradiso in the Central Region of Costa Rica; the city of Ixhuatlán del Café in the Veracruz state of Mexico; and the department of Huehetenango in Guatemala. The local coffee producers' associations of each of these countries were contacted to select the sample (i.e. Brazil: Centro do Comércio de Café do Estado de Minas Gerias (CCCMG); Colombia: Colombian Coffee Federation (FNC); Costa Rica: Costa Rican Coffee Institute (ICAFE); Guatemala: Guatemalan National Coffee Association (Anacafe); Mexico: Mexican Associacion of Coffee's Productive Chain (AMECA)) and asked for

[4] The indicators and survey were developed by the Centre for Intelligence on Sustainable Markets (CIMS) a non-profit organization based in Costa Rica For confidentiality reasons we are unable to reveal the name of the in-house certification.

the lists of farmers located in the areas of interest. Within each country, the farms were selected on the basis of the following baseline criteria:

(1) they must have been in operation for at least three years;

(2) they are independently owned;

(3) their main economic activity is coffee production;

(4) the business is located in one of the regions where the global buyer sources its coffee in Brazil, Colombia, Costa Rica, Guatemala and Mexico.

Farms not meeting these criteria were removed from the list. Following standard practice and precedent, a random sample was selected from the resulting list of coffee farms and selection was stratified based on farm size (small, medium and large). This resulted in a stratified random sample of a total of 862 coffee farms was drawn consisting of: 138 farms in Brazil, 274 farms in Colombia, 138 farms in Costa Rica, 156 farms in Guatemala and 156 farms in Mexico. After having cleaned this target sample from non-respondents (some farms were found to have ceased trading), outliers, invalid and missing responses, we end up with a final sample of 575 farms, consisting of 96 farms in Brazil, 199 farms in Colombia, 91 farms in Costa Rica, 90 farms in Guatemala and 99 farms in Mexico. The sample includes 365 certified farms, and 210 non-certified farms.[5]

Tests were performed to see if there are any systematic statistically significant differences between the respondents and the non-respondents. No statistically significant differences were found at the 0.05 level, or better, between the respondents and non-respondents and the size of the firms, the age of the firms, the altitude where the firms are located, and the region. Accordingly, there is

[5] The sample of certified farms that results from the selection covers on average 7% of the total population of farmers holding the specific in-house certification analyzed in this study, up to the year in which the survey was conducted in each region (5% in Brazil; 4% in Colombia; 6% in Costa Rica; 16% in Guatemala and 5% in Mexico). Furthermore, since the focus of this paper is to assess whether in-house certifications improve the environmental and social conduct of farmers (with respect to non-certified ones), we also excluded from the final sample 17 firms holding a certification different from the in-house one of the global buyer (e.g. C.A.F.E, UTZ, Organic, Rainforest, Fairtrade). However, we exploit this out-of-sample information to build an additional instrumental variable in order to test the over-identifying restrictions of our econometric model (see also footnote 12).

evidence that the representativeness of the final sample for the population of coffee firms, in the countries surveyed, is preserved.

The questionnaire was administered to the farms' owner/founder or general manager (in case it is a different person). The data collection phase lasted two years, between late 2008 and early 2010, while it took another two years to process and codify the data into a dataset for this study.[6] The structured questionnaire was distributed across the five countries studied. All field researchers received three full days of training that focused on a full understanding of the project objectives, the importance of neutrality as data collectors, and the need to show respect for the coffee farmers. Data was collected via face to face interviews by field researchers and by direct inspection to monitor environmental and social practices.

The questionnaire was designed specifically for the context under investigation and tailored to account for the different sizes of the farms, with the majority of our sample being represented by small farms employing up to ten workers (60%), in line with evidence of coffee production elsewhere (e.g. Luna & Wilson, 2015). Because this is a farm-level survey, it is also important to clarify here that all the farms employ at least one person (both family or contract) beside the owner,[7] which is important to note given that most social provisions are about workers and their families' rights.

The questions were developed to evaluate the impact of certifications on a broad series of farm-level indicators, and were organized into four sections (i.e. general farm-level information, economic data, environmental sustainability and social sustainability). The questions included in the social and environmental sustainability sections were coherent with all key certification standards' provisions (see next section). In order to ensure that the questionnaire content was valid, it was tested it on 5 academics and 12 coffee farmers, of whom at least 2 were from each of the five countries

[6] We acknowledge that the survey was conducted across two consecutive years when price fluctuations may have occurred. However, since farmers located in the same country were surveyed in the same year, the regional dummy variables included in our econometric models capture both the heterogeneity of the geographical characteristic and the unobserved time effects (such as price fluctuations across different regions between 2008 and 2009).

[7] We thank an anonymous reviewer for her/his remarks on this point. We clarify here that 70 per cent of the farms employ paid workers (sometimes beyond unpaid work), while the remaining 30 per cent employees unpaid family workers exclusively.

included in the study. The questionnaire was then revised using feedback from academics and coffee farmers. The running order of some questions was altered, and several questions were dropped because the questionnaire was perceived as too long. After the questionnaire was revised it was re-shown to 2 of the original coffee farmers and 2 additional new coffee farmers, and no further changes were deemed necessary. None of the farmers consulted in ensuring the validity of the questionnaire are included in the final sample.

4.2 Econometric model and descriptive statistics

The baseline specification of our econometric model is the following linear regression equation in which the dependent variable *Y** can be either the index of environmental (*ENV*) or social (*SOC*) conduct of firm *i*:

$$Y_i^* = \alpha + \beta CERTIF_i + \gamma X_i + \delta_j + u_i \qquad (1)$$

To build the dependent variables we rely on the answers to the questionnaire, which includes numerous items investigating different aspects of farmers' social and environmental conduct (the full list of items is available in the Appendix, Tables A1 and A2). Each item represents a question on either a social or an environmental issue and replies to each question have been coded on a 0 to 1 scale. Some answers are dichotomous (e.g. Does the firm keep an energy consumption registry?), while the ones based on Likert scaling (e.g. distance from the medical attention center) were rescaled to range between 0 and 1 after checking the consistency of their directions (i.e. 0-> worst conduct, 1-> best conduct). The dependent variables *ENV* and *SOC* are then defined as the mean of the valid answers for each of the environmental and social items respectively. Accordingly, each variable ranges from a minimum of 0 to a maximum of 1.

$CERTIF_i$ is the main independent variable of interest, and it is a dummy, which is equal to 1 if firm *i* holds the in-house certification (and 0 otherwise).

The matrix *X* in Eq (1) includes the following set of moderating factors and control variables.

(a) Moderating factors:

- a dummy variable concerning the type of the firm's main intermediary (*COOP),* which is equal to one if the farmer sells mainly to cooperative organizations and zero if it sells to private intermediaries (i.e. intermediary agents, traders and/or exporters; coffee roasters and other non cooperative organizations);
- an index of institutional quality (*GOVERN*) of the farmers' home country, computed by averaging three measures of the Kaufmann, Kraay, and Mastruzzi's (2011) World Bank Worldwide Governance Indicators, namely: a) government effectiveness, b) regulatory quality and c) rule of law. The effect of the quality of governance was measured using national level statistics given that subnational level data on this dimension were not available. Given the relatively limited variability of the resulting index across the countries under investigation, we codify it as a dummy variable taking the value of 0 for firms located in countries with low institutional quality and 1 for firms located in countries with medium-high institutional quality, using the median of the original index (-0.07) as a threshold value;
- farmers' economic status (*INCOME*), defined as the total net income (in thousands of US Dollars), which is measured as the farm's net income per hectare multiplied by the number of hectares of the farms' coffee plantation, divided by 1000.[8]

(b) Control variables: [9]

- the size of the firm, measured as the (logarithm of the) number of hectares of its cultivated coffee area (*SIZE*);

[8] We acknowledge that this measure of farmers' income does not account for other potential sources of income farmers may have. However, we note here that our sample includes only farms whose main source of income is coffee production, which mitigates our concerns about the validity of this measure. We thank an anonymous reviewer for suggesting us the need to consider a farmer-level measure of economic status.

[9] We compute the variables *SIZE*, *AGE* and *YIELD* in logarithm in order to have a scale-free interpretation of the estimated coefficient (semi-elasticities) and to reduce the influence of outliers.

- the age of the farm, measured as the (logarithm of the) number of years since it started to produce coffee (*AGE*);
- altitude where the firms are located, defined as the (logarithm of the) average height in meters (*ALTITUDE*), which is a proxy for the coffee beans quality.
- firm's productivity, defined as the (logarithm of the) number of kilograms of yield produced per hectare (*YIELD*);

Finally, the baseline model includes also a set of regional dummy variables δ_j (j=1,…,8) and a firm specific, normally distributed error term u_i. Note that, to the baseline model presented here, we add a number of robustness checks to control for endogeneity (self-selection bias), measurement errors and non-response bias (see Sections 5.2 to 5.4).

The pair-wise correlation coefficients amongst the full set regressors involved in our models is reported in the correlation matrix in the Appendix (Table A3). Although some of the pair-wise correlations are statistically significant, the collinearity diagnostics based on the Variance Inflation Factor (VIF), computed for each estimated model (and reported in all the estimation output tables at the bottom of each column), show that there is no problem of multi-collinearity, since the values of the VIFs are always well below the standard thresholds (4 and 10) used as rules of thumb in the literature (O'Brien, 2007).

Table 1 reports the main descriptive statistics of the variables involved in the analysis. Amongst the 575 firms in the final sample, 365 (63.48%) hold an in-house certification. The number of firms that sell mainly to cooperative organizations (*COOP*) is 350 (60.87%) of the sample. If we disaggregate by country of origin of the farmers (Table 2-Panel B), we observe some variation. On average, Mexican farmers appear to have amongst the lowest scores for both measures of social and environmental conduct, while Brazilian firms have on average more hectares of plantation than farmers in other countries (35 hectares) and are also those with a lower incidence of certification (28 per cent). Finally, Table 2 Panel C shows distribution of the farmers according to the main type of direct buyers (*COOP* vis-à-vis other intermediaries) disaggregated by country. We observe that

Brazilian and Colombian farmers sell almost entirely to cooperatives, while Costa Rican and Mexican farmers sell mostly through other intermediaries.

Similarly to Arnould et al. (2009), in our regression analysis we control for many observable characteristics in order to estimate the *ceteris paribus* effect of certification on a sample of certified and non-certified farmers randomly selected from a lists of farmers located in the areas of interest (thus sharing the same climate, geography, and growing conditions) and satisfying the same set of criteria listed in Section 4.1. In Section 5.4 we will also exploit PSM methods (as suggested in Blackman and Naranjo, 2010) in order to build a more restricted control group of non-certified farmers matching a set of observable characteristics similar to the certified ones.

[Table 1 about here]

5. EMPIRICAL RESULTS

In this section, we report the estimation results of the baseline model (Eq. (1)) when first considering the dummy variable *CERTIF* as exogenous, i.e. uncorrelated with the error term u_i of Eq. (1). We then relax and test this assumption by generalizing our econometric model with a system of two equations that takes into account of the potential simultaneity between the farm's level of environmental/social conducts and its decision to apply for certification. We further assess whether the effect of in-house certification on the farm's environmental and social conduct is moderated by the type of the main local buyer, the institutional quality of the farmers' home country and the farmer's economic status. Next, we check the robustness of our main findings by re-computing the dependent variables *ENV* and *SOC* with a weighting factor based on the response-rate of each single item, as well as using a measurement model based on latent factors. Finally, we used several econometric methods such as outlier-trimming robust regression, matching estimators and quantile regression to further check the robustness of our results.

5.1. Results for the baseline model

Tables 2 and 3 report the estimation results, for different specifications of the baseline model (Eq. (1)), when considering as dependent variable the firm's index of environmental (*ENV*) and social (*SOC*) conduct, respectively. Since both these variables are bounded between 0 and 1, we estimate model (1) using ordinary least squares (OLS) and maximum-likelihood generalized linear models (GLM) with a logit link function.

The coefficient on the dummy *CERTIF* is positive and statistically significant for predicting the environmental conduct of the firm (Table 2). The estimated parameter for the GLM model in column (6) is +0.243 (standard error 0.082), which corresponds to an expected increase (average marginal effect) of about 26% of the sample standard deviation of the dependent variable for a certified farm (with respect to a non-certified one). On the other hand, the estimated marginal effect of *CERTIF* on the social conduct of the firm (Table 3) is very low and never statistically significant.[10]

Concerning the type of intermediary, farms that sell mainly to cooperative organizations (*COOP*) seem to have, on average, a better environmental conduct than farms selling to private intermediaries. In contrast, we do not observe a statistically significant relationship between farm's social conduct and the type of intermediary. The farm's home country institutional quality (*GOVERN*) positively affects its social conduct, but not significantly its environmental conduct. Finally, the level of farmer's economic status (*INCOME*) is, ceteris paribus, negatively associated with environmental conduct, which means that poorer farmers declare to enact a better environmental conduct than wealthier farmers, although the statistical significance of the estimated coefficient in the GLM model (Table 2, column 6) appears to be weak (10% level).

Looking at the control variables, we find the expected positive coefficients for farm's size (*SIZE*), productivity (*YIELD*) and altitude (*ALTITUDE*) for explaining both its environmental and social conduct (Tables 2 and 3).

[10] Following one reviewer's comment, we performed a split sample analysis on Brazilian farms, since these are larger than farms in other countries (see Table 1) and therefore their social conduct is likely to impact on a larger number of people, generating a greater incentive for enacting a good social conduct. Our split sample results, however, do not indicate any impact of certification on social conduct in the context of Brazil, in line with results on other countries.

[Tables 2 and 3 about here]

5.2 ***Endogeneity checks***

The coefficients associated with the independent dummy variable (*CERTIF*) in Eq. (1), estimated in the previous section, can be affected by endogeneity bias. In fact, the farms' levels of environmental and social conduct and their decision to apply for certification could be simultaneously determined. This would lead to a potential correlation between *CERTIF* and the error term u_i in Eq. (1), which, in turn, would lead to a bias in the OLS and GLM estimates. In order to check and take into account this issue, which could also be driven by the omission of relevant unobserved variables from Eq. (1), we estimate the following system of two simultaneous equations:

$$\begin{cases} Y_i^* = \alpha_1 + \beta_1 CERTIF_i + \gamma_1 X_i + \delta_{1j} + u_{1i} & (2a) \\ CERTIF_i^* = \alpha_2 + \beta_2 Z_i + \gamma_2 X_i + \delta_{2j} + u_{2i} & (2b) \end{cases}$$

where X includes the same set of moderating and control variables defined in the previous sub-section, δ includes a set of regional dummy variables, Z is an instrumental variable (*CERT_GROWTH*, defined below) while u_{1i} and u_{2i} are error terms assumed to follow a bivariate normal distribution with mean zero and variance/covariance matrix Σ equal to:

$$\Sigma = \begin{bmatrix} \sigma^2 & \rho\sigma \\ \rho\sigma & 1 \end{bmatrix}.$$

The first equation (Eq. (2a)) has the same specification of Eq. (1) and the certification decision (Eq. (2b)) is assumed to be the observed binary outcome of an unobservable latent variable ($CERTIF_i^*$) defined according to the following rule: $CERTIF_i = 1$ if $CERTIF_i^* > 0$, and $CERTIF_i = 0$ if $CERTIF_i^* \leq 0$. The model is estimated using the Full Information Maximum Likelihood (FIML) method proposed by Maddala (1983) for binary endogenous variables.

The instrumental variable (*CERT_GROWTH)*, which is included in Eq. (2b) but excluded from Eq. (2a) in order to identify the system, is computed as the annual growth rate of the share of farms, located in the same region *k* (*k*=1,…,10), holding a certification from a program of the same global buyer.[11] Our assumption, for the identification of the system of Eq. (2a) and (2b), is that the variable *CERT_GROWTH* has a direct (and expected positive) effect on the decision of farm *i* to be certified, but no direct effect on its environmental and social conduct, because the latter can be decoupled from the standards associated to the certification soon after the certification has been obtained.

Figure 1 plots the average time trend of the share of certified firms in each region (upper panel) and its yearly growth rate (lower panel). The average share of certified farms shows the typical shape of a logistic function, with an accelerating trend up to year 2007, that becomes quite flat afterwards.

[Figure 1]

Table 4 reports the FIML estimates of the system of equations when considering, as dependent variable for equation (2a), both the scores of firm's environmental (column (1)) and social (column (3)) conduct. The FIML estimation results for Eq. (2a) are similar to the OLS/GLM ones of Eq. (1), suggesting that no severe endogeneity bias was present in our previous estimates. This evidence is also supported by the Wald test of independent equations, which indicates that the null hypothesis of no correlation (ρ=0) between the treatment error u_{2i} and the outcome errors u_{1i} terms cannot be rejected. The validity of the instrumental variable *CERT_GROWTH* is supported by the under-identification, weak-identification, over-identification and orthogonality tests (reported at the bottom

[11] The focal farm *i* has been excluded from the computation of the shares by taking, as a reference period, one-year lag with respect to its certification date or with respect of the survey reference period in case of right censoring (i.e. if farm *i* was not certified at the end of the period of observation).

of Table 4).[12] Furthermore, the estimated parameter of *CERT_GROWTH* in Eq. (2b) is strongly significant and with the expected positive sign. Looking at the estimation results of Eq. (2b) in columns (2) and (4) of Table 4, we find that the probability to hold a certification is larger for larger farmers, for farmers having cooperatives as main intermediaries and for farmers located in countries with high institutional quality and in regions with low altitude.

[Table 5 about here]

5.3 Moderating effects of farmers' main intermediaries, home country institutional quality and economic status

The purpose of this section is to assess whether the certification effect on the farmer's social and environmental conducts (as analyzed in the previous sections) is moderated by the type of its main intermediary, the institutional strength of the farmers' home country and the farmer's economic status.

Since in the previous section we did not detect any severe endogeneity issues affecting the OLS/GLM estimates of model (1), we extend it by adding several interaction terms involving the dummy *CERTIF* multiplied by *COOP*, *GOVERN* and *INCOME*. Tables 5 and 6 report the OLS and GLM estimates when considering each type of moderating factor separately (columns (1)-(3)) and jointly (columns (4) and (5)). Therefore, the sign and statistical significance of the coefficients associated with the dummy variable *CERTIF* and its interaction terms in columns (1)-(5) change according to reference category represented in each model.

[Tables 5 and 6 about here]

[12] For the over-identification and orthogonality tests we used, as additional instrumental variable, the annual growth rate of the share of firms (located in the same region *k*) holding a certification program different from the one of the global buyer. The descriptive statistics for this variable are available upon request.

Provided that in the full GLM model (column (5) in Tables 5 and 6) there are multiple and repeated interaction terms that cannot be directly used to check the magnitude and statistical significance of the moderating factors (Tsai and Gill, 2013), we ease the interpretation of the reported estimates by computing the marginal effects and their statistical significance using delta methods (Barthus, 2005). The computed marginal effects of the independent and moderating variables are reported in Table 7 (columns (1) and (2)). When considering the firm's environmental conduct (*ENV*) as dependent variable (column (1)), we still find a positive and significant marginal effect (+0.054) associated with the dummy *CERTIF*. This effect is stronger when the main intermediary is a cooperative (+0.060, buyer type: *COOP*) and when the farm is located in a country with low institutional quality (0.100, *GOVERN*: low=(0)).[13] The variable *INCOME* does not appear to be a significant moderator for *CERTIF*, since the estimated effect of certification on the environmental conduct is almost the same for low and high income farmers (+0.054). In contrast, if we consider the firm's social conduct as dependent variable (*SOC*, column (2)) no significant effect is found with reference to our moderators (type of the main intermediary, home country institutional quality and farmer's economic status).

[Table 7 about here]

5.4 Robustness checks

In this section we check the robustness of our results in several ways. In order to take into account the different response rate across the items used to compute the dependent variables (*ENV* and *SOC)*, we re-compute them as weighted averages of the items (instead of the previously used un-weighted averages), by weighting each single item with its response-rate (*ENV_WA* and *SOC_WA)*. We then re-calculate the main marginal effects of the full GLM using these new dependent variables (columns (1) and (2), Table 8) to see if they are still in line with the ones previously reported (in columns (1)

[13] These estimated effects of certification are significantly different from the ones estimated when considering the other reference categories (i.e.: intermediary = NON COOP and GOVERN = high(1)).

and (2), Table 7). The estimated marginal effects do not change considerably. The dummy *CERTIF* still has an estimated positive and significant effect (+0.048) on the firm's environmental conduct, which is stronger when the main intermediary is a cooperative (+0.051) and when the farm is located in a country with low institutional quality (+0.069) and has (approximately) the same magnitude when considering low and high income farmers (+0.07 and +0.048, respectively). In addition to the earlier results, we observe here a positive and significant effect of certification on the social conduct, but only for farmers located in high institutional quality countries (+0.014).

In addition, to further check the robustness of our results to different measurements of the dependent variables, we estimate a Multiple Indicators Multiple Causes (MIMIC) Structural Equation Model (Jöreskog & Goldberger, 1975) involving two latent constructs for the environmental (*ENV_MM*) and the social (*SOC_MM)* conduct of the firm. The measurement parts of these two latent endogenous variables are defined by the following equations:

$$Ei = \lambda_{Ei} ENV\_MM + e_i \qquad (3a)$$

$$Sj = \lambda_{Sj} SOC\_MM + s_j \qquad (3b)$$

where *Ei* (*i*=1,…,17) and *Sj* (*j*=1,…,21) are the set of items listed in Tables A1 and A2 of Appendix, λ_{Ei} and λ_{Sj} are the estimated loadings (reported in Tables A1 and A2 respectively) and e_i, s_j are measurement errors. The structural equations of the model are defined similarly to the baseline model (1) (Figure A1 in the Appendix illustrates the structure of the estimated MIMIC model).

$$ENV\_MM = \alpha_{ENV\_MM} + \beta_{ENV\_MM} CERTIF + \gamma_{ENV\_MM} X + u_{ENV\_MM} \qquad (4a)$$

$$SOC\_MM = \alpha_{SOC\_MM} + \beta_{SOC\_MM} CERTIF + \gamma_{SOC\_MM} X + u_{SOC\_MM} \qquad (4b)$$

The marginal effects computed from the estimated structural parameters α, β, γ, are reported in columns 3 and 4 of Table 8. The magnitude of these marginal effects are different from the ones in

columns 1-2 because *ENV_MM* and *SOC_MM* are standardized latent variables.[14] However, the statistical significance of the marginal effects is roughly similar across the models, thus supporting the robustness of our results with respect to different measurement (and measurement errors) of the dependent variables.

[Table 8 about here]

As a final robustness check, we re-estimate the marginal effects of *CERTIF* on all three measures of farmers' environmental and social conduct (*ENV; SOC; ENV_WA; SOC_WA; ENV_MM; SOC_MM*) using three different econometric techniques: i) an outlier-trimming robust regression using weights based on the Cook's distance of each observation (Rousseeuw & Leroy, 1987); ii) an Average Treatment Effect on the Treated (ATT) based on PSM with eight nearest neighbors;[15] iii) a quantile regression computed at the 25^{th}, 50^{th} and 75^{th} percentiles.

The estimation results are reported in Table 9. The robust regression and PSM estimates confirm the sign and magnitude of the marginal effects of *CERTIF*, whereas the results of the quantile regression highlight a stronger and positive estimated effect of *CERTIF* for the lower quantiles of *ENV*, i.e. certification improves the environmental practices for the farmers having a "bad" environmental conduct and less for farmers with an already "good" environmental conduct. The results in Table 9 also highlight some small differences in the statistical significance across the different dependent variables adopted. In particular when considering *SOC_MM* we find now a positive and statistically significant effect of certification on social conduct, although this is still very small in magnitude.[16]

[14] If we multiply these marginal effects by the sample standard deviations of *ENV* and *SOC* we find similar magnitudes.
[15] When we estimated the ATT using PSM, none of the non-certified farmers was excluded from the common support. The median absolute bias computed when checking for the balancing properties of the matched units was less than 8%. Therefore, in our sample non-certified farmers reasonably represent an adequate control group for the estimation of the average treatment effect on certified firms.
[16] These differences can be explained in the light of the different methodologies used for weighting the set of questionnaire items used to build our composite indicators for the farmers' environmental and social conduct, as explained in this section and in the Appendix.

[Table 10 about here]

6. CONCLUSIONS

As large global buyers in the coffee industry have developed their own in-house socio-environmental standards and related certification schemes, questions arise regarding their success in delivering the expected outcomes, particularly in the improvement of farmers' social and environmental conduct. While most of the earlier research has investigated the impacts of multiparty and NGO-led certifications like Fairtrade, UTZ or Organic (see Blackman & Rivera, 2010 and Loconto & Dankers, 2014 for recent reviews), we focus here in-house certifications on the grounds that private certification schemes are on the rise, and may work differently from other types of certifications.

Our work hinges upon the notion of decoupling, which, borrowing from earlier research (Meyer & Rowan, 1977; Bromley & Powell, 2012; Marquis & Qian, 2013), we define as deviation between the certification standards' provisions and the actual conduct or practice undertaken by farmers after being certified. Decoupling occurs when farmers are not fully compliant with the certification's socio-environmental policies and guidelines and, as a consequence, their social and environmental conduct is not expected to differ significantly from that of similar non-certified farmers. Our focus on social and environmental conduct is justified by evidence documenting farmers' difficulty in obtaining benefits from compliance (Blackman & Rivera, 2012; Loconto & Dankers, 2014), and by the relatively more limited attention to these impacts vis a vis purely economic impacts (e.g. Chiputwa et al., 2015; Handschuch et al., 2013; Jena et al., 2015; Kleeman et al., 2014; Van Rijsbergen et al., 2016; Utting-Chamorro, 2005).

To investigate this issue, we rely on original survey data on 575 coffee farmers located in different regions of Brazil, Colombia, Costa Rica, Guatemala and, Mexico. We conducted an

econometric analysis using different estimators (OLS, GLM, FIML, outlier trimming robust regression, PSM, quantile regression) in a quasi-experimental setting (Blackman & Rivera, 2010) and controlled for self-selection as a robustness check.

Our results are discussed as follows. First, we find that, while in-house certifications may improve the way farmers deal with environmental issues, they are not an easy fix for social issues: certified farmers do not display a substantially better social conduct than non-certified ones. To interpret this result, we recur to the different incentives and rewards farmers may associate to either conducts: heighted attention to social issues may be perceived as costly to farmers while delivering very little immediate returns. For instance, paying higher salaries or improving the safety conditions of workers through e.g. building an aid center in the farm may be expensive for most small scale farms and farmers may oppose or delay these kinds of interventions. Our results on social conduct are aligned with earlier research on certifications in agribusiness, which found that certifications have very limited, or statically insignificant impact on health and education-related issues of their workforce and families (Becchetti & Constantino, 2008; Mendez et al., 2010; Ruben & Zuniga, 2011). More broadly, these findings resonate with studies conducted in other industries, which show how introduction of codes of conduct in the context of developing countries' suppliers of global value chains have controversial impacts on social upgrading, conceptualized as improvements in workers' conditions (e.g. De Neve, 2009; Mezzadri, 2012; Rossi, 2013; Puppim de Oliveira & de Oliveira Cerqueira Fortes, 2014). For instance, Rossi (2013) finds that Moroccan fast fashion suppliers do not protect the rights of informal workers, essentially because they cannot afford it. As she puts it: "firms need to have the means to be compliant. If they cannot cover the expenses, they ask themselves why they are doing it. …If they have to choose between survival and exports, they will choose survival, which means that *they would delay the social compliance* and maybe not export as much as they would, rather than close the factory because they cannot afford the expenses" (Rossi, 2013, quoting an interviewee, p. 231, emphasis added).

In contrast, farmers with in-house certifications are more diligent in terms of their environmental conduct, a result that we interpret in light of the higher efficiency that certain environmentally-friendly practices may bring about. For instance, re-use of sewage water may result in a lower consumption of water, while other measures – such as recycling – can improve the farm's waste management and give tangible direct benefits to the farm. This interpretation is also in line with research about the positive impacts of multilateral/NGO-led certifications on farmers' environmental management (Rueda et al., 2013; Ibanez & Blackman, 2016; Takahashi & Todo, 2013), and with research conducted in other industries (see e.g. Khattak, Stringer, Benson-Rea, & Haworth, 2015), suggesting that an incentive for suppliers to maintain good environmental performance is the reduction of operational costs that it produces.

A concurrent explanation to this result is that environmental provisions can be more easily codified into practices and therefore they are more easy to perform and monitor, while social provisions may be more complex to both implement and monitor, and more likely to generate conflicts within the value chain in the post-certification period. It is also possible, moreover, that buyers themselves place different emphasis on social vis a vis environmental issues, and are looser in monitoring the former. Unfortunately, we could not double-check the plausibility of this interpretation with the buyers, but earlier research has shown that this type of selective focus by buyers may indeed take place. For instance, in their work on Indian football manufacturing, Jamali et al. (2015) find that global buyers placed great emphasis on the eradication of child labor in their supply chain, but did not equally paid attention to other major issues such as job discrimination or gender inequality, which guarantee them significant production efficiency gains. Hence, in the context of our research, it is possible that global buyers' major emphasis on environmental, rather than social issues, produces what Jamali et al. (2015) call a 'selective decoupling' strategy, where compliance is expected only on issues that are more salient – either because they are less complex, more cost-effective, easier to monitor or to govern.

A second result of our analysis is related to the role played by cooperatives as intermediary organizations. We find that farmers that sell most of their produce to cooperatives display a better environmental conduct than farmers selling mostly to private intermediaries. Furthermore, when farmers sell to cooperatives, the positive impact of in-house certification on environmental conduct is higher, which means that certified farmers display a better environmental conduct than non-certified ones especially when they sell to cooperatives. None of these results hold for farmer's social conduct: farmers selling to cooperatives do not display a better social conduct, nor we observe a moderating role of cooperatives on the relationship between holding the in-house certification and social conduct. This ambivalent result of cooperatives on the social or environmental practices is noteworthy. On the one hand, it supports earlier research suggesting that cooperatives, through social monitoring or enhanced coordination, can engender processes of upgrading (Arnould et al., 2009; Luna & Wilson, 2015; Perez-Aleman, 2011; Shepherd, 2007; Wang & Qin, 2012; Wollni & Zeller, 2007) which can eventually help farmers to undertake more environmentally sustainable practices. On the other hand, it casts doubts on the effectiveness of these mechanisms improve the coffee farms' social conditions. This latter result is of course not entirely new, as several studies before ours have expressed concerns about cooperatives as an organizational model, pointing at collective action problems and free riding (Sexton, 1986; Staatz, 1987; Pennerstorfer & Weiss, 2012; Fischer & Qaim, 2012; Ortiz-Miranda, & Moragues-Faus, 2015), and sharing concerns about cooperatives' capacity to deliver the expected benefits to their members and affiliates (Cechin et al., 2013; Mujawamariya et al, 2013; Murekezi et al., 2012; Utting-Chamorro, 2015). As Shepherd (2007, p. 7) puts it: *"The very success of this relatively limited number of cooperatives is often used to justify further investment to try to replicate that success elsewhere. Unfortunately, with these honourable exceptions, the track record of cooperative development has often been disappointing."*

We are unable to dig more deeply into the motivations for our result about the failure of farmers that sell to cooperatives to be more socially sustainable, as we lack information on the

qualities and characteristics of the cooperatives and their internal functioning. One possibility is, again, that addressing or improving social practices may be particularly complex to accomplish, and cooperatives may not be a strong enough institution to promote this process.

This brings us to the third result of our analysis, which concerns the role of the home country government as enabler through the quality of its institutions (Loconto and Dankers, 2014). While, as noted above, cooperatives do not appear to help certified farms to be more socially sustainable, we do observe a direct effect of countries' institutional strength on farmers' social conduct. Possibly, this is due to the fact that institutionally stronger countries are better able to enforce the rule of law and ensure justice on matters that have to do with workers' rights and health-related issues, generating a disincentive for decoupling on these matters.

This result juxtaposes with the negative moderation of countries' institutional quality in the relationship between in-house certification and environmental conduct, which means that the effect of being certified is higher when farmers are located in institutionally weak countries. These findings are coherent with the idea that in a weaker institutional context, global buyers provide assistance and support farmers' efforts in improving their social and environmental practices (London & Hart, 2004; London, 2008; Porter & Kramer, 2006; 2011). Another interpretation is that that weak institutional contexts work as springboards for farmers, who may see private certifications as one of the few opportunities they have to build a better and more sustainable future. In other words, the standards demanded by global buyers may act as a source of guidance and stimulus that the farmers' country institutional apparatuses are unable to offer. Not surprisingly, moreover, it is farmers with the poorest environmental conduct who benefit more from being certified, while certification does improve less the environmental conduct of farmers with "already good" environmental management standards. This finding is also consistent with the evidence of relatively poorer farmers (i.e. low income) displaying a better environmental conduct. Deprivation, loosely understood as lower income and government weaknesses, seems therefore to be a trigger for enhancing farmers' environmental conduct.

Overall, our work contributes to the literature on the impact of socio-environmental certifications on farmers' social and environmental conduct, with a focus on in-house certifications, which have received less attention from prior research especially if compared to other kinds of certification schemes (Arnould et al., 2009; Ibanez & Blackman, 2016; Renard, 2010; Rueda et al., 2013; Ruben & Zuniga, 2011; Wollni et al., 2010). We contribute to earlier research by examining some of the factors that may concur to the existence of a positive relationship between socio-environmental policies and practices, and suggest that key drivers of social conduct may be widely different from drivers of farmers' environmental conduct. In a nutshell, strong home country institutions appear a fundamental ingredient for the promotion of a more socially sustainable production, whereas other types of institutions, like certifications and cooperatives, may serve the purpose of enhancing environmental sustainability in the absence of strong country-level institutions.

Yet our study limits the observation of socio-environmental impacts to the items and issues that were part of the certification scheme's main objectives or provisions, not on the advancements promoted by the adoption of the in-house certification on the overall enjoyment of local communities' human rights, and on the eradication of different types of unfreedoms (Sen, 1999; Giuliani & Macchi, 2014). In fact, a large part of contemporary studies on standards and certifications focuses on compliance in these narrow terms, while we concur with the need to study the link between policies and practices and their expected outcome (Bromley and Powell, 2012), which is that of building a more sustainable and just society.[17] We leave this very important area of research to future endeavors.

Our study does also tangentially contribute to recent research interested in understanding whether suppliers' participation in global value chains (or global production networks) contributes to their social and/or environmental upgrading (e.g. Barrientos, Gereffi & Rossi, 2011; De Marchi,

[17] We thank an anonymous reviewer for suggesting this way forward in research.

Di Maria & Micelli, 2013; Rossi, 2013; Selwyn, 2013; Poulsen, Ponte & Lister, 2016). As Gereffi and Lee (2016) recently pointed out, we still know very little about the conditions under which economic and social upgrading can be mutually supportive. Similarly, very little is known about how environmental upgrading comes about (De Marchi et al., 2015). Our evidence highlights that social and environmental upgrading may be very distinctive processes and leaves open questions about whether advancing in one may come at the expense of the other.

This paper has some limitations and the results should be interpreted with some caution. We could only count on cross-sectional data, because of the cost and the difficulty of replicating the survey data collection on the same farmers for several periods. Hence, our analysis is performed in a quasi-experimental setting, by comparing the different environmental and social conduct of certified vs. non-certified firms, conditional on several observable characteristics (ceteris paribus), under the assumption that no other relevant variables or confounding factors have been omitted in our models. Although we checked the robustness of our results (including for self-selection issues) using different measurement methods, econometric tools and model specifications, the causal interpretation of our findings should be taken with some caution, as panel data setting or the random treatment assignment in a randomized control trial have proven to be statistically more robust approaches for impact evaluations. Moreover, our data did not allow us to distinguish between different kinds of cooperatives, and therefore we treated these intermediaries as a unique homogenous bundle, which is probably over simplistic. A more qualitative ethnographic approach to the analysis of the influence of cooperatives and, more broadly, on the processes through which our moderators influence farmers' conduct could be a valuable way forward and complement to this study. Finally, we acknowledge that our measures of environmental and social conduct have been computed using the answers provided by the respondents on a set of questionnaire items during a third-party audit and we may have (inevitably) lost some information when summarizing in one 0-1 score such a complex and multidimensional construct. An interesting research avenue would be to couple these measures with more objective/quantitative indicators based e.g. on the number

registered events of environmental/social misconduct registered by independent observers, among others.